

Urban and Mobile Source Air Toxics

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Urban Air Toxics Strategy

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Plan for Developing Urban Strategy

- Define the air toxics situation for urban areas in a comprehensive manner
- Improve our understanding of the risk associated with urban air toxics
- Work with State and local governments on developing urban strategies for their communities
- Reduce the risks from urban air toxics through national and local actions (short and long term)
- **Consent Decree: Draft Strategy - 8/31/98; Final Strategy - 6/18/99**

Included in Draft Urban Air Toxics Strategy

- *Published for public comment:*
 - ▶ Draft list of 33 air toxics of concern
 - ▶ Draft list of 34 area source categories for emission standards
 - ▶ Schedule for actions on mobile source controls

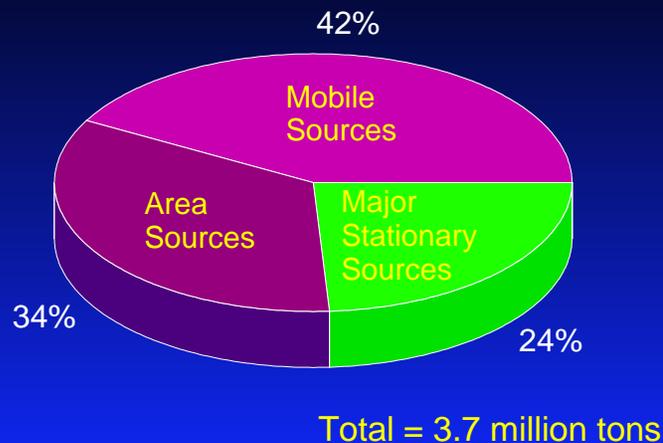
Draft list of HAP for the Integrated Urban Air Toxics Strategy

- acetaldehyde
- ethylene dichloride (1,2-dichloroethane)
- acrolein
- ethylene oxide
- acrylonitrile
- formaldehyde
- arsenic compounds
- hydrazine
- benzene
- lead compounds
- bis(2-ethylhexyl) phthalate
- manganese compounds
- 1,3-butadiene
- mercury compounds
- cadmium compounds
- methyl chloride
- carbon tetrachloride
- methylene diphenyl diisocyanate (MDI)
- chloroform
- methylene chloride (dichloromethane)
- chromium compounds
- nickel compounds
- coke oven emissions
- polycyclic organic matter (POM) (7-PAH).
- 1,4-dichlorobenzene
- propylene dichloride (1,2-dichloropropane)
- 1,3-dichloropropene
- quinoline
- 2,3,7,8-tetrachlorodibenzo-p-dioxin (& congeners & TCDF congeners)
- ethylene dibromide (dibromoethane)
- trichloroethylene
- tetrachloroethylene (perchloroethylene)
- vinyl chloride

Draft List of Source Categories for Regulation Under 112(k)

- Abrasive Grain (Media) Manufacturing.
- Acrylic and Modacrylic Fiber Production.
- Agricultural Chemicals and Pesticides Manufacture.
- Manufacture of Nutritional Yeast.
- Cadmium Refining and Cadmium Oxide Production.
- Chemical Manufacturing: Chromium Compounds.
- Electronic and other Electric Equipment Manufacturing (SICs combined).
- Food Products (SICs combined) manufacturing.
- Gasoline Distribution Stage I.
- Hospital Sterilizers.
- Industrial Inorganic Chemical Manufacturing.
- Industrial Machinery and Electrical Equipment (SICs combined).
- Industrial Organic Chemicals Manufacturing.
- Instruments and Related Products (SICs combined).
- Iron and Steel Foundries: Steel Foundries.
- Landfills (excluding Gas Flares).
- Mineral Wool Manufacturing (includes Wool Fiberglass).
- Miscellaneous Manufacturing (SICs combined).
- Mobile Homes Manufacturing.
- Nonclay Refractories.
- Oil and Gas Production: Glycol Dehydrators.
- Paint Application (no spray booths).
- Pharmaceuticals Preparations and Manufacturing (SICs combined).
- Plastics Materials and Resins Manufacturing.
- Plastics Products Manufacturing.
- Primary Copper Smelting.
- Primary Metal Products Manufacturing (SICs combined).
- Publicly Owned Treatment Works (POTWs).
- Reconstituted Wood Products.
- Sawmills and Planing Mills, general.
- Secondary Copper Smelting.
- Secondary Smelting and Refining of Nonferrous Metals.
- Storage Batteries Manufacturing.
- Textiles (SICs combined).

1993 Air Toxics Emission Inventory



1990 Statutory Requirements

- • 202(l)(1): ...complete a study of the need for and the feasibility of, controlling emissions of toxic air pollutants which are unregulated under the Act and associated with motor vehicles and motor vehicle fuels, including emissions of benzene, formaldehyde, and 1,3-butadiene.
- • 202(l)(2): ... based on the study under paragraph (1), promulgate regulations containing reasonable requirements to control HAPs from motor vehicles and motor vehicle fuels, ... reflect the greatest degree of emission reduction achievable, taking into consideration the availability and cost of the technology and noise, energy, safety factors, and lead time. ...at a minimum, apply to benzene and formaldehyde.

1993 Study-Overview

- Previous air toxic studies conducted in 1987 and 1989.
- 1993 MVRATS comprehensively summarized what was known about motor vehicle-related air toxics.
- Focused on carcinogenic risk. Discussion of non-cancer effects was qualitative due to the lack of sufficient health data to quantitate effects.
- Did not address whether or how to regulate motor vehicle-related toxic emissions.
- Primary carcinogens examined: benzene, formaldehyde, 1,3-butadiene, acetaldehyde, and diesel particulate matter

1993 Study -Nationwide Estimated Annual Individual Cancer Risk* (cases/deaths) 1990 Base Control Scenario

Pollutant	Cancer Risk
Benzene**#	0.28 x 10 ⁻⁶
Formaldehyde	0.18 x 10 ⁻⁶
1,3-Butadiene#	1.22 x 10 ⁻⁶
Acetaldehyde	0.02 x 10 ⁻⁶
Diesel PM**#	0.44 x 10 ⁻⁶

- * Nationwide annual cancer risk from study divided by 1990 total U.S. population
- **Cancer deaths
- #Unit risk estimates being updated and will be available to recalculate individual risks for the final analysis.

1993 Study - Annual Cancer Incidences in Future Years - Baseline Comparison

	1990	1995	2000	2010
Benzene	70	43	35	35
Formaldehyde	44	28	21	22
1,3-Butadiene	304	209	176	204
Acetaldehyde	5.3	3.6	2.8	3.0
Diesel PM	109	66	39	27

Status of EPA Risk Updates Since 1993

- Benzene -- Revised to a range.
- 1,3 - Butadiene -- More confidence, lower, still draft.
- Diesel PM -- Much higher, still draft.
- Formaldehyde -- Proceeding with an update

Assessment of Motor Vehicle Emissions and Exposure in 9 Urban Areas

- Intensive 2 year effort involving FED, ORD, and the following contractors: ManTech, Dyntel, Sierra Research, Radian, EEA
- Toxics modeled are benzene, 1,3-butadiene, formaldehyde, acetaldehyde, MTBE, diesel PM
- Nine urban areas: Chicago, Denver, Houston, Minneapolis, New York, Philadelphia, Phoenix, Spokane, St. Louis
- 1990, 1996, 2007, 2020

Toxics Emissions Modeling

- Emissions Model
 - ▶ Specially modified MOBILE5b including approximations to revisions planned for MOBILE6
 - ▶ Part 5 used for diesel PM
- Exhaust and evaporative toxic fractions applied to TOG estimates
- Accounts for difference in toxic fractions between tech. groups, normal and high emitters, on-cycle and aggressive driving
- Fuel Effects: FED compiled 1990 and 1996 fuel properties as well as projecting 2007 and 2020 fuel properties

Exposure Modeling

- HAPEM exposure modeling conducted by ORD for OMS
 - ▶ estimated CO exposure by quarter for many demographic groups
 - ▶ these CO exposure estimates were apportioned to onroad vehicles using CO source apportionment data from the Trends database
- CO exposure is used as a tracer for toxics exposure since most CO is attributable to mobile sources

Exposure Modeling

- Modeled onroad CO exposure is ratioed to 1990 CO g/mi estimates to create a conversion factor
- This conversion factor is applied to the modeled toxic emission estimates to determine exposure to onroad toxic emissions

$$\begin{array}{l} \text{CO EF g/mile} \\ \text{CO } \mu\text{g/m}^3 \text{ exposure} \\ \text{(HAPEM adjusted for onroad)} \end{array} = \begin{array}{l} \text{toxic X EF } \mu\text{g/mile} \\ \text{toxic X exposure} \end{array}$$

$$\text{toxic X exposure} = \frac{\text{CO } \mu\text{g/m}^3 \text{ exposure from HAPEM}}{\text{CO EF g/mile}} \times \text{toxic X EF } \mu\text{g/mile}$$

Exposure Modeling

- Exposure estimates are adjusted for post-1990 VMT growth
- 1,3-Butadiene is adjusted for atmospheric transformation, aldehydes are not
 - ▶ the work to adjust the aldehydes for primary and secondary contributions will be done in-house

Next Steps

- Add Atlanta to other 9 cities.
- Reconcile 9-city VOC emissions to latest thinking.
 - ▶ Draft MOBILE6 modeling approaches
 - ▶ Planned or contemplated regulations
- Apply cancer unit risk factors.
- Relate 10 cities to the rest of the U.S.
- Get stakeholder and peer review.
 - ▶ New MSTRC workgroup?
 - ▶ Align with Tier2/Sulfur comment period?
- Use results to determine reasonableness of toxics control beyond criteria regulations already in place or planned.
 - ▶ NPRM in September 1999.
 - ▶ FRM in July 2000.
- Continue to help broader EPA effort.